

October 2010 Climate Summary for Southwest Lower Michigan

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Overview

October 2010 was warmer than normal. The last month that was colder than normal in Southwest Lower Michigan was October 2009. Most of Southwest Lower Michigan ranged from two to four degrees warmer than normal with the warmest section being around Jackson.

Precipitation was below normal over western and southern sections but near to above normal east of US-131 and north of Interstate 96. Total rainfall amounts ranged from over five inches in parts of central Isabella County to around an inch near Jackson.

There was no reported snowfall in Southwest Lower Michigan this October. Since 2001 there have been five years (2001, 2002, 2003, 2006 and 2008) with measurable snow in Southwest Lower Michigan. In most of the years that had snow, it was mostly near and north of Route 10 and east of Baldwin.

This was the sunniest October since 1956 with 67 percent of total possible sunshine. In a typical October, there is about 44 percent of possible sunshine. There have only been three Octobers since 1991 with more than 50 percent of possible sunshine. The record sunniest October occurred in 1938 when 80 percent of possible sunshine was observed.

There was one severe thunderstorm episode in October that occurred on the morning of the 26th. Three severe thunderstorm wind damage events were reported. At Grand Rapids, the sea level pressure fell to 29.08 inches during the morning of the 26th. This reading tied with October 1959 for the second lowest October sea level pressure ever recorded at Grand Rapids. The lowest pressure for October was 29.01 inches in October of 1971.

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Table 1. Average temperature and precipitation / snowfall totals for October 2010 at the primary climate stations. Normals are computed from the 1971-2000 30-year average.

Location		Average Temperature (degrees F)	Precipitation (inches)	Snowfall (inches)
Grand Rapids	<i>Reported</i>	53.5	2.61	0.0
	<i>Normal</i>	49.9	2.80	0.6
	<i>Departure</i>	+ 3.6	- 0.19	- 0.6
	<i>Record Max Avg (year)</i>	70.9 (1963)		
	<i>Record Min Avg (year)</i>	32.9 (1952)		
	<i>Record Max (year)</i>	89 (1897)	8.32 (1954)	8.4 (1967)
	<i>Record Min (year)</i>	18 (1988, 1974)	0.03 (1952)	0.0
Lansing	<i>Reported</i>	52.2	2.82	0.0
	<i>Normal</i>	49.2	2.29	0.4
	<i>Departure</i>	+ 3.0	+ 0.53	- 0.4
	<i>Record Max Avg (year)</i>	73.0 (1963)		
	<i>Record Min Avg (year)</i>	24.8 (1869)		
	<i>Record Max (year)</i>	90 (1898)	7.32 (1941)	7.5 (1967)
	<i>Record Min (year)</i>	10 (1895,1868)	0.28 (1956)	0.0
Muskegon	<i>Reported</i>	53.0	2.13	0.0
	<i>Normal</i>	49.7	2.80	0.6
	<i>Departure</i>	+ 3.3	- 0.67	- 0.6
	<i>Record Max Avg (year)</i>	69.1 (1963)		
	<i>Record Min Avg (year)</i>	35.5 (1952)		
	<i>Record Max (year)</i>	95 (1953,1954)	7.33 (1991)	6.0 (1910)
	<i>Record Min (year)</i>	27 (1989,1991)	0.20 (1924)	0.0

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Average Temperature Departure from Mean in Degrees F
October 1, 2010 to October 31, 2010

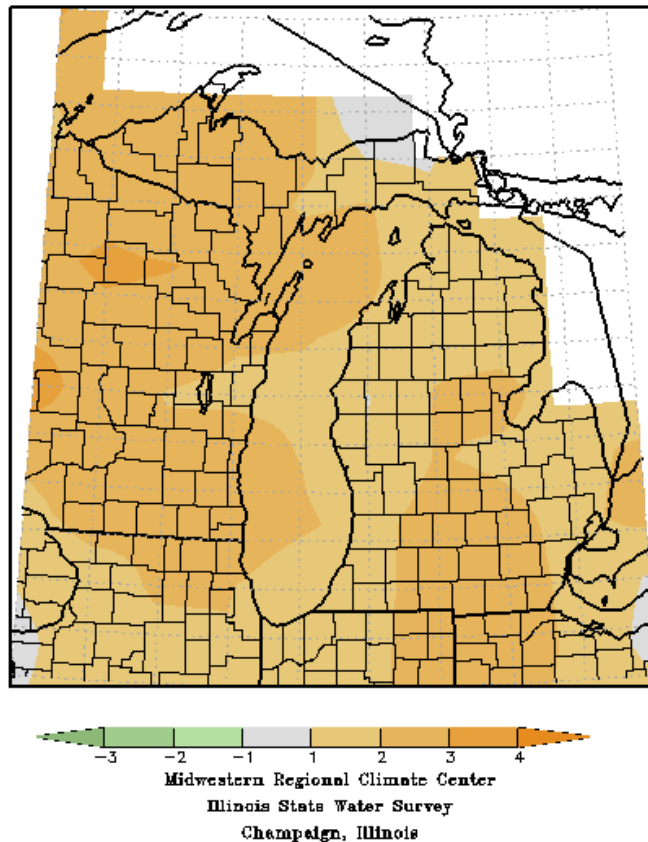


Figure 1. October 2010 average temperature departure from normal for the state of Michigan.

Temperatures:

Temperature departures from normal ranged from around 1 degree above normal west of US-131 to as much as 6 degrees above normal by Gull Lake (Figure 1). Most of Southwest Lower Michigan near and east of US-131 was around between 2 and 3 degrees above normal. The area average was 2.4 degrees above normal.

With a mean temperature of 51.7 degrees, this October was 5.1 degrees warmer than October 2009. Of the last 10 Octobers, there were four colder than normal and three warmer than normal. This trend toward cooler Octobers began in the mid 1970s. Looking at all the Octobers from 1976 through 2010, the average temperature is 49 degrees. However, that is about 2 degrees cooler than the average temperature from 1900 through 1970, which is about 51 degrees. The warmest October on record was 1947 with a mean of 58.7 degrees. The coolest October was 1917 with a mean of 43.1 degrees. The state rank for temperature was 75th coldest or 42nd warmest (Figure 2). For Southwest Lower Michigan, October 2010 was similar to the state ranking being the 41st warmest on record.

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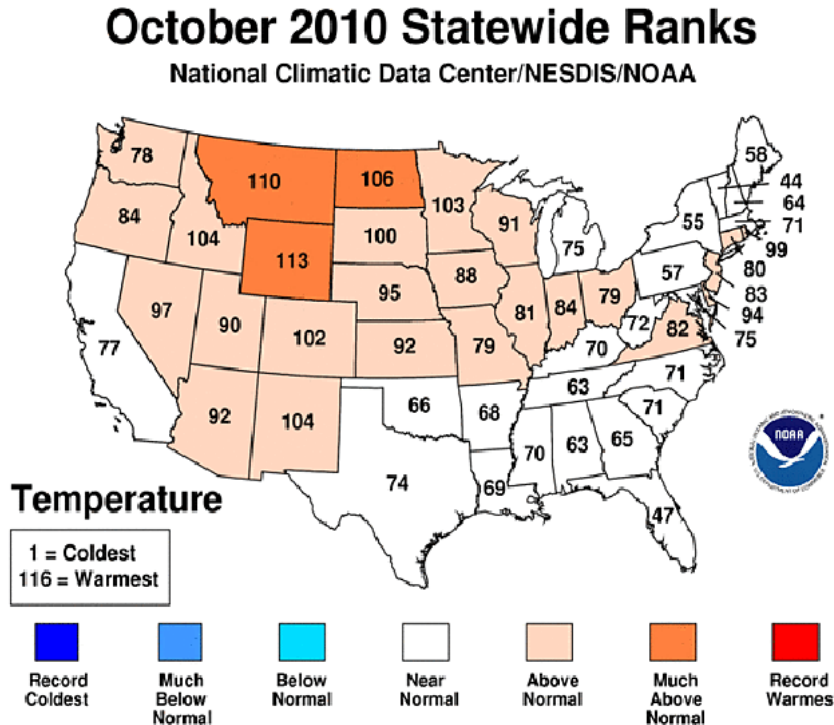


Figure 2. National Climate Data Center ranking state temperature ranking for October 2010.

October began on the warm side of normal, but quickly cooled off after a Canadian cold front moved through the area during the late afternoon on the 1st (Figures 3-5). This brought below freezing temperatures to much of the area each morning from the 4th and the 5th. Many locations near and north of I-94 had their first freeze of the season. Leota in Clare County had the coldest low temperature during this cold spell with a low of 20 degrees on the 4th. Lansing had its first freeze of the season on the morning of the 5th, with a low of 31 degrees.

It was warmer than normal from the 6th through the 13th with daily temperature anomalies between 10 and 15 degrees above normal. Highs rose to around 80 on the 10th and the 11th. Kalamazoo had the warmest highs during this period with its 85 degree reading on the 9th. Typical of fall though, low temperatures were still falling into mid 40s to lower 50s each night.

Temperatures were near normal from the 14th through the 22nd. On the morning of the 22nd, temperatures fell below freezing across most of Southwest Lower Michigan. It was the first freeze for Grand Rapids and Muskegon. At these locations, the first freeze on the 22nd was about two weeks later than the typical first freeze date of the 8th for Grand Rapids and the 9th for Muskegon (Table 2).

Another warm spell began on the 23rd and continued through the 27th. This was not as warm as the beginning of the month, but highs reached the lower 70s on the 24th and 25th. Another cool air mass moved into the area on the 28th and that brought temperatures back to near normal. Highs were in the mid 40s to mid 50s and lows in the 30s to around 40.

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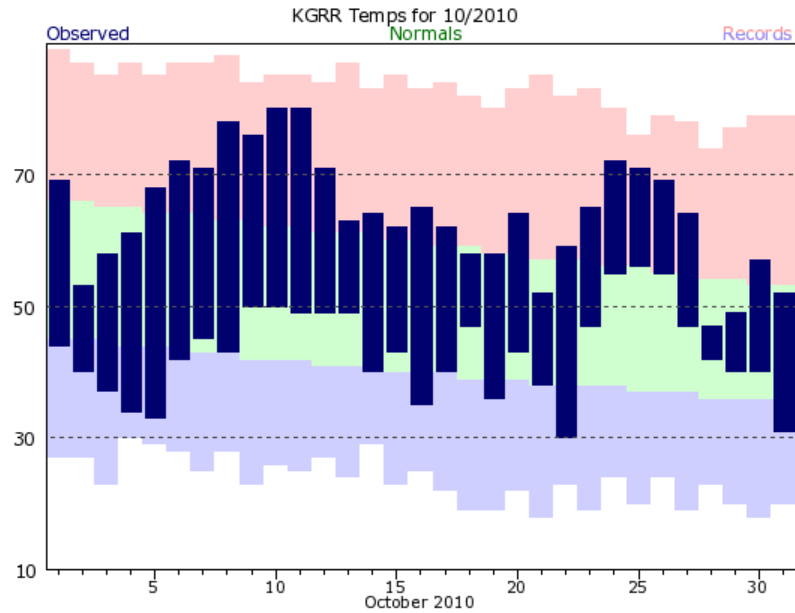


Figure 3. Observed temperatures at the Grand Rapids International Airport. Dark blue bars are the temperature range for each day. The green strip indicates the normal range of temperatures. Record high and low temperatures are indicated at the top of the pink area and the bottom of the blue area, respectively. Normals computed as in Figure 1.

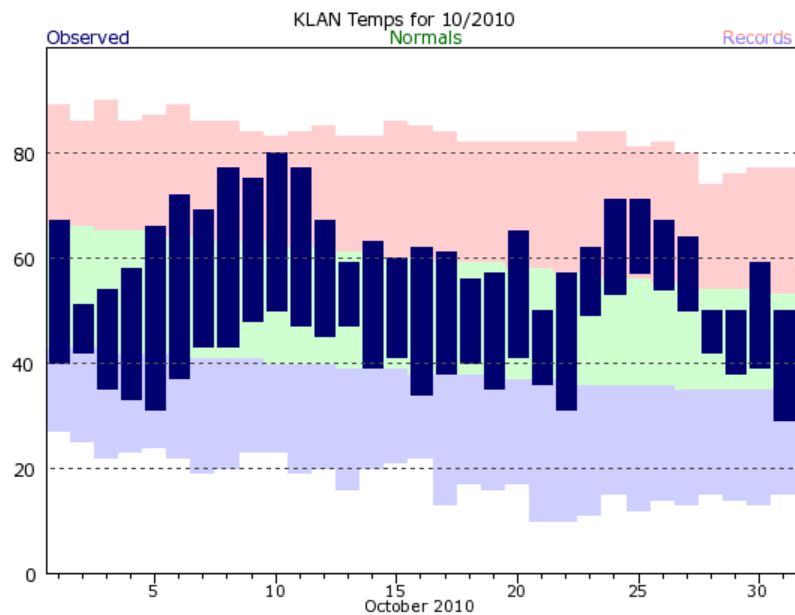


Figure 4. As in Figure 3, except for the Lansing/Capital City airport.

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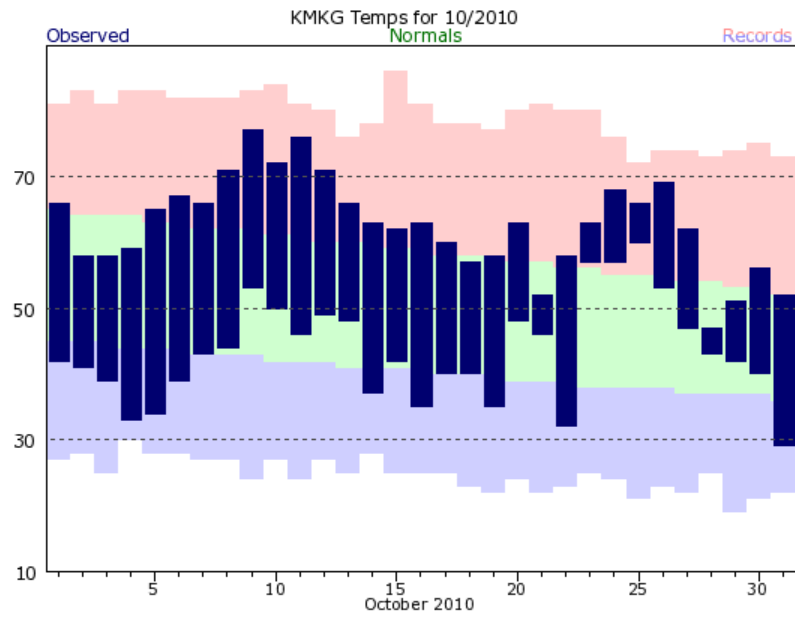


Figure 5. As in Figure 3, except for the Muskegon County airport.

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Table 2. October 2010 temperature frequencies at the primary climate stations.

Number of days	Grand Rapids	Lansing	Muskegon
<i>highs \geq 90 (2010)</i>	0	0	0
<i>highs \geq 90 (2009)</i>	0	0	0
<i>highs \geq 90 (normal)</i>	0	0	0
<i>highs \geq 90 (record)</i>	0	1	0
<i>year(s) of record</i>	-	1898	-
<i>highs \geq 80 (2010)</i>	2	1	0
<i>highs \geq 80 (2009)</i>	0	0	0
<i>highs \geq 80 (normal)</i>	0.8	0.8	0.3
<i>highs \geq 80 (record)</i>	8	11	5
<i>year(s) of record</i>	1963,1953	1963	2005
<i>lows \geq 60 (2010)</i>	0	0	1
<i>lows \geq 60 (2009)</i>	0	0	0
<i>lows \geq 60 (normal)</i>	0.6	0.4	1.0
<i>lows \geq 60 (record)</i>	6	9	6
<i>year(s) of record</i>	1899	1879	2007
<i>Mean First 32 Low Day</i>	Oct. 8th	Oct. 3 rd	Oct. 9th
<i>2010</i>	Oct 22 nd	Oct 5th	Oct 22 nd
<i>2009</i>	Oct 1st	Oct 1 st	Oct 1st
<i>Earliest</i>	Sept. 03 1946	Aug. 03 1894	Sept. 08 1951
<i>lows $<$ 32 (2010)</i>	2	3	2
<i>lows $<$ 32 (2009)</i>	4	7	3
<i>lows $<$ 32 (normal)</i>	5.1	7.9	5.5
<i>Greatest # $<$ 32 (record)</i>	17 (1952)	28 (1868)	13 (1952)

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Precipitation:

Precipitation was heaviest over the central sections of Southwest Lower Michigan (Figure 6). Areas north and east of Grand Rapids had the greatest rainfall. Mount Pleasant reported 5.28 inches of rain in October, which was the largest amount from any reporting station. The least amount of rainfall was over the area near Jackson and Brooklyn. Jackson reported 1.14 inches of rain while Brooklyn had only 0.96 inches.

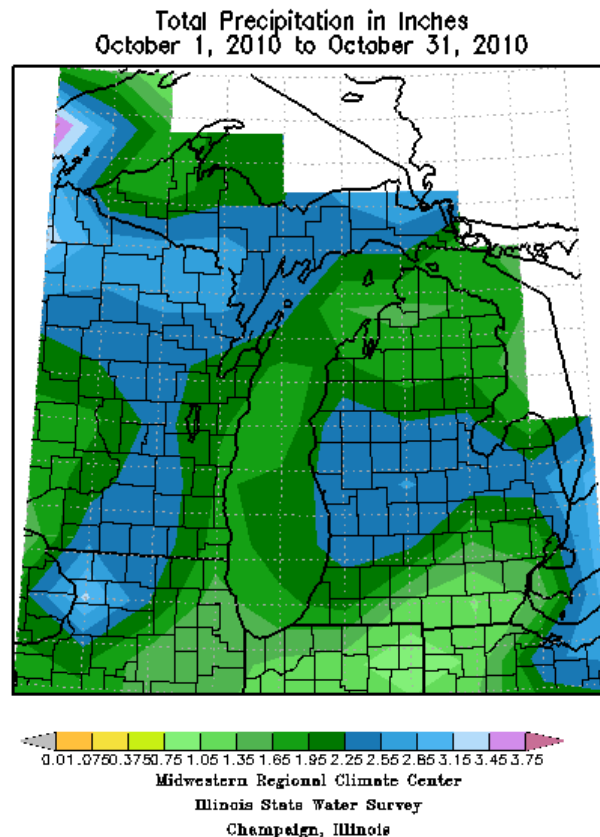


Figure 6. Total precipitation for Michigan during October 2010.

As a result of the heaviest rainfall being north and east of the Grand Rapids area in October, rainfall deficits ranged from nearly 2.5 inches above normal at Mount Pleasant to around 1.5 inches below normal at Brooklyn (Figure 7). Most locations were between 0.5 inches below normal to 1.5 inches below normal. The mean precipitation anomaly was around 0.7 inches below normal. This drier than normal concept is seen nicely on the state of Michigan ranking for October 2010 of 32nd driest out of 116 years or data (Figure 8).

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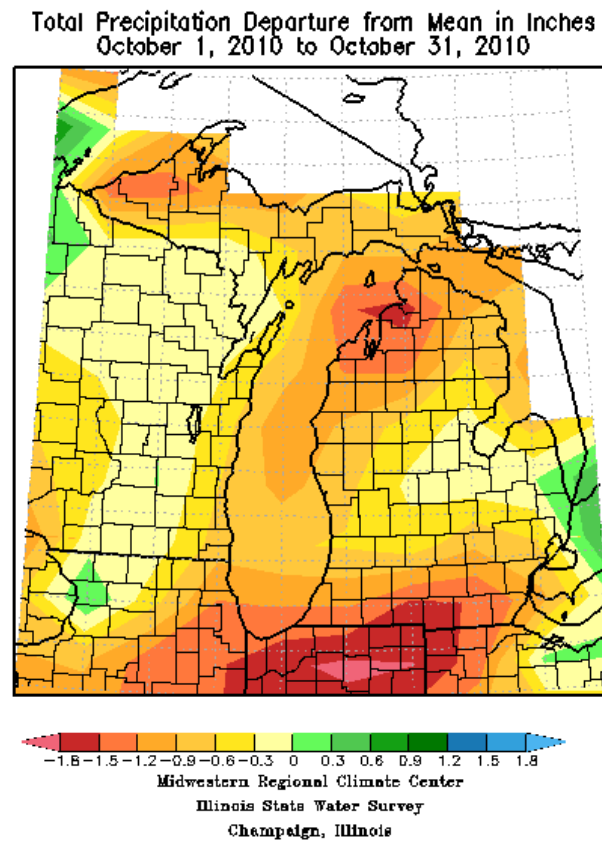


Figure 7. Precipitation departure from normal for Michigan during September 2010.

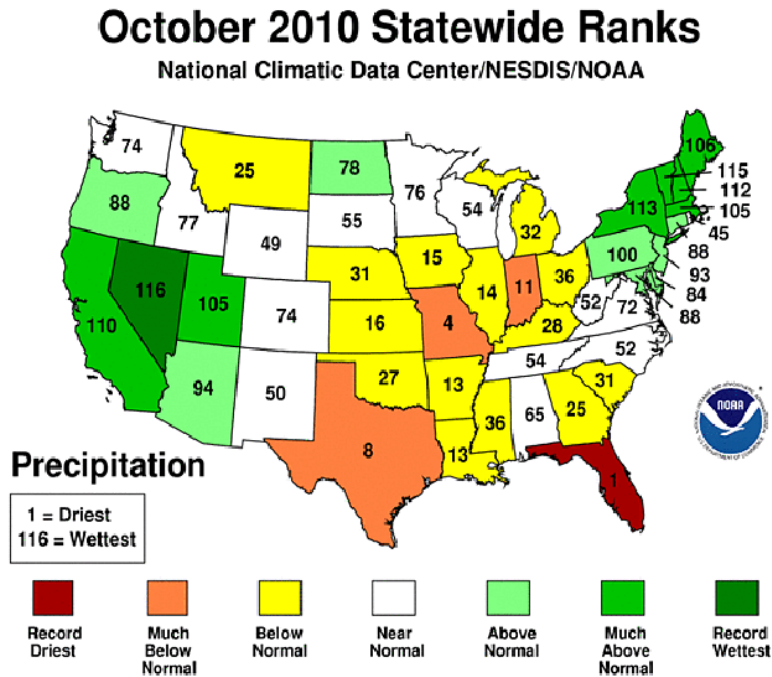


Figure 8. National Climate Data Center state precipitation ranking for October 2010.

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In terms of the daily precipitation, there were several events that brought local rainfall amounts between a half inch and an inch (Figures 9-11). The first event was with the frontal system on the 1st, which brought between a half inch and one and a half inches of rain to areas north of I-96 and east of US-131. Central Clare County had the heaviest rainfall from this event. The next significant rain event was due to a frontal wave passing south of Lower Michigan during the 13th into the 14th. That brought between a quarter and three quarters of an inch of rain to the area, with the area north of Lansing seeing the heaviest rainfall from this event. A clipper type system brought up to a half inch of rain near Muskegon later on the 14th into early on the 15th.

The heaviest rainfall event of the month was from a developing storm over the southwestern United States that headed for Wisconsin later on the 24th into the 25th. That brought up to two and a half inches of rain at Bloomingdale between the morning of the 24th and the morning of the 25th. That was the heaviest 24 hour rainfall reported for October 2010 in Southwest Michigan. The storm on the 26th that set pressure records brought a quarter to half an inch of rain to most of the area, with locations east of Grand Rapids having the heaviest rainfall from that event.

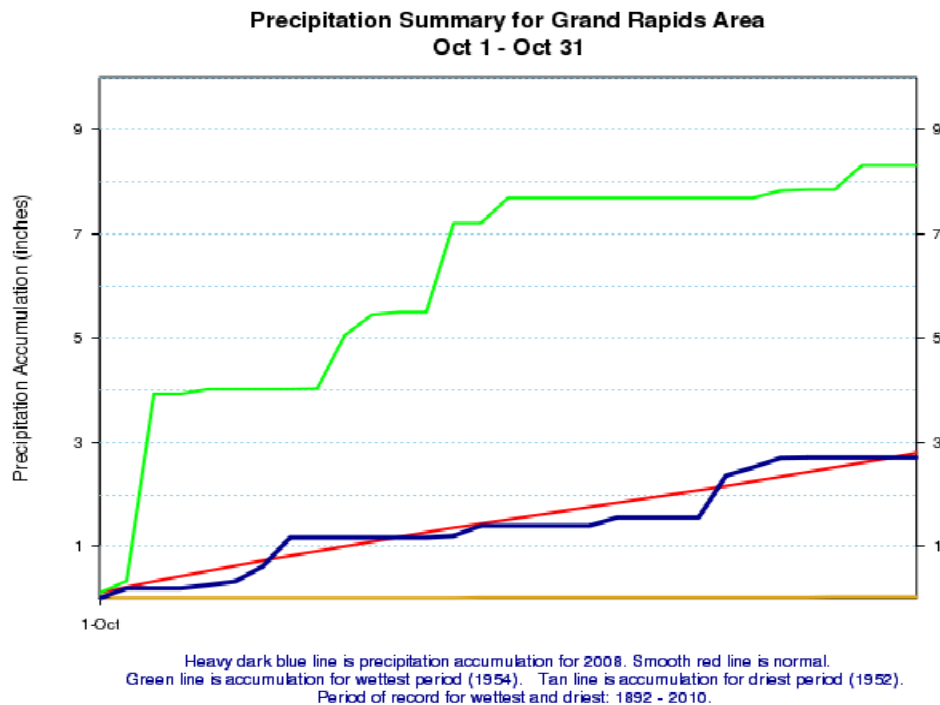


Figure 9. Daily precipitation in inches for October 2010 at the G.R. Ford International Airport.

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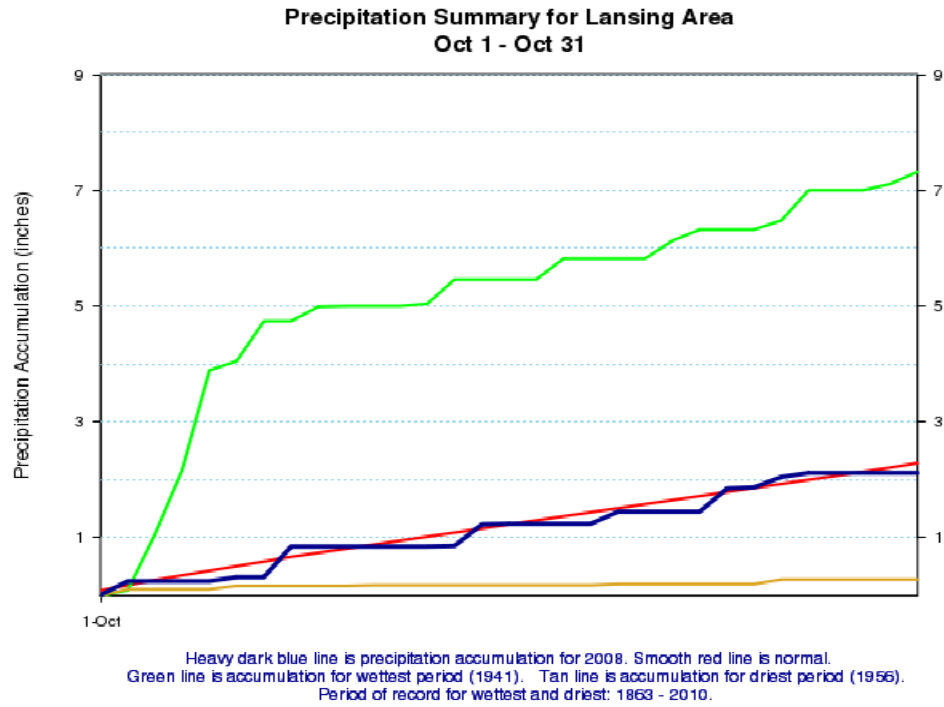


Figure 10. As in Figure 9, except for the Lansing Capital City Airport.

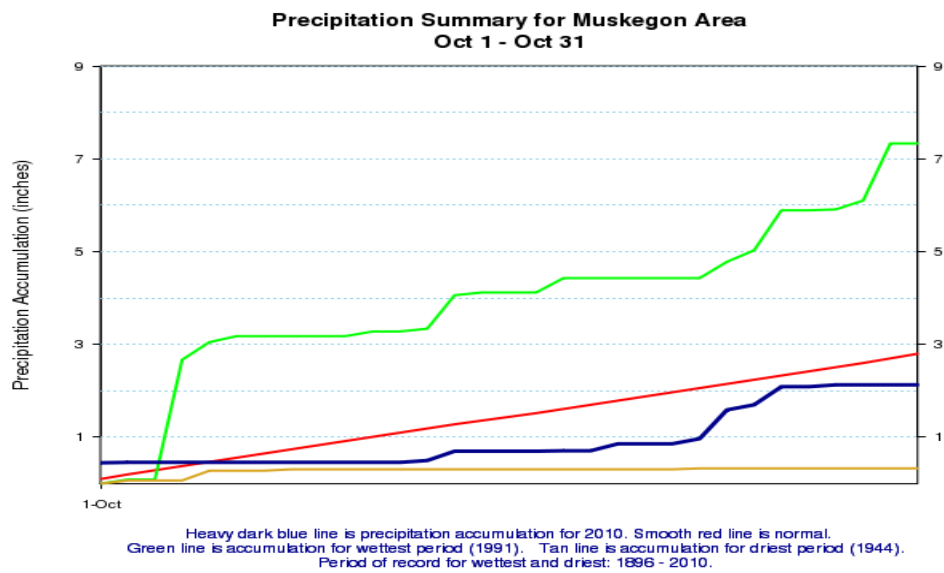


Figure 11. As in Figure 7, except for the Muskegon County Airport

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Severe Storms:

While severe thunderstorm activity was below normal in October this year, there was still one event on October 26th (Table 3). There were three reports of severe storm wind damage during the morning hours of October 26th. Last year we had no severe storms in October. Six of the last ten years had severe weather reported in October. The most active October was 2007 when we recorded 74 severe storm reports (Figure 12). All of those occurred between the 18th and 19th. On October 19th, there were 68 severe storm reports, which turns out to be the greatest number of severe storms ever reported in Southwest Lower Michigan on a calendar day in any month of any year.

Table 3. Reported severe weather events and episodes across Southwest Lower Michigan for October. An episode is defined as three or more events within 6 hours.

<i>Events (Oct. 2010)</i>	3
<i>Events (Oct 2009)</i>	0
<i>Events (1986 – 2010 average)</i>	6
<i>Events (record)</i>	74
<i>year(s) of record</i>	2007
<i>Episodes (2010)</i>	1
<i>Episodes (2009)</i>	0
<i>Episodes (1986 – 2010 average)</i>	1
<i>Episodes (record)</i>	3
<i>year(s) of record</i>	2002, 2006

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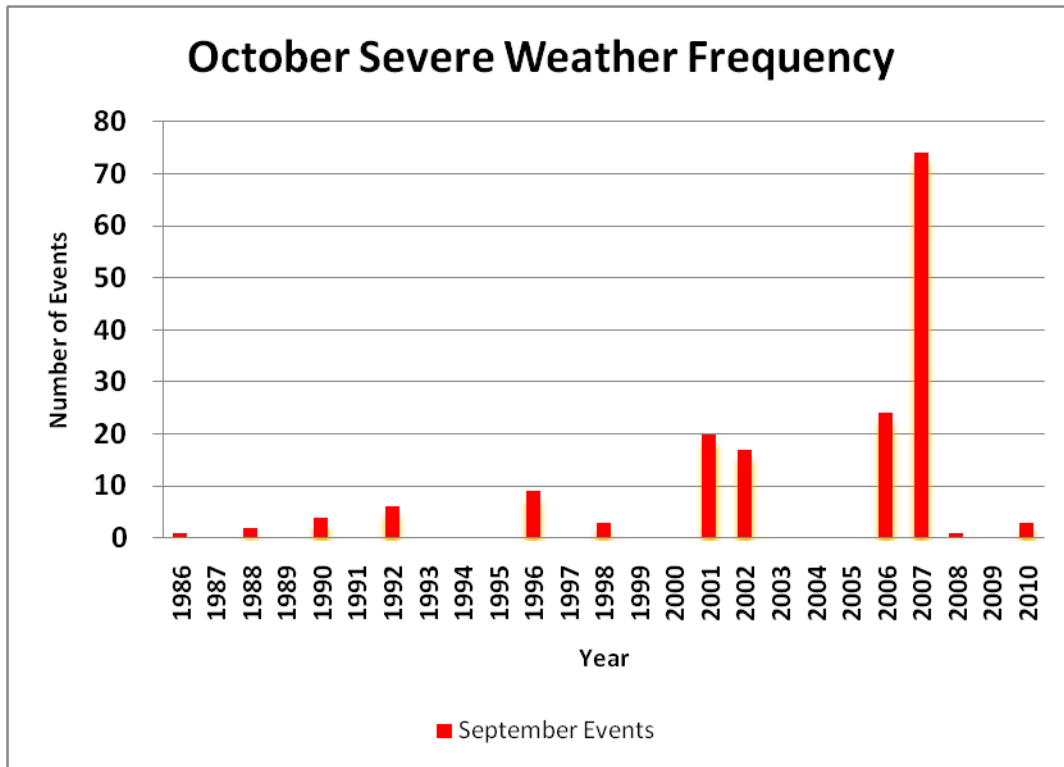


Figure 12. The total number of severe weather events from 1986 to 2010 across Southwest Lower Michigan.

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Highlights of the month of October 2010

1st – 2nd

A cold front moved through the area late in the day on the 1st which brought between 0.25 and 2.0 inches of rain to the area (Figure 13). The heaviest rainfall was north of Lansing and east of Grand Rapids.

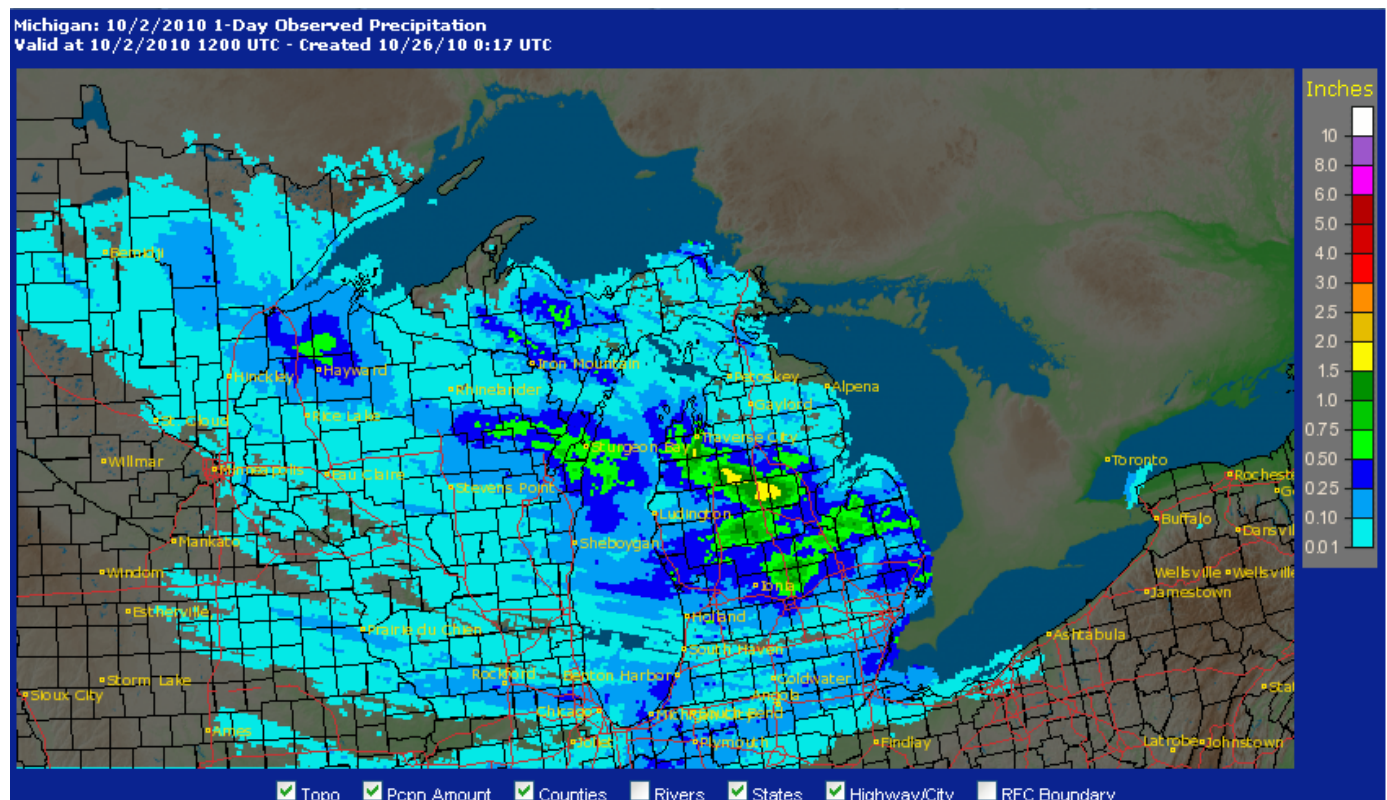


Figure 13. The rainfall event of October 1st into early on October 2nd

2nd -5th

Sunny, cool and dry weather prevailed. The first freeze of the season occurred in the area north of I-96 and east of US-131. Lansing had its first freezing low temperature of the season on the 5th. Leota in Clare County had a low of 20 degrees on the 4th.

6th - 12th

Sunny and warm weather prevailed. High temperatures reached their warmest levels of the month on the 10th and 11th. Areas along I-94 had highs in the mid 80s, while those living near I-96 had highs in the upper 70s to lower 80s.

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13th - 14th

The combination of a Canadian cold front and southern stream frontal wave brought between a quarter and three quarters of an inch of rain to the area. Once again the area near and north of Lansing had the heaviest rainfall (Figure 14).

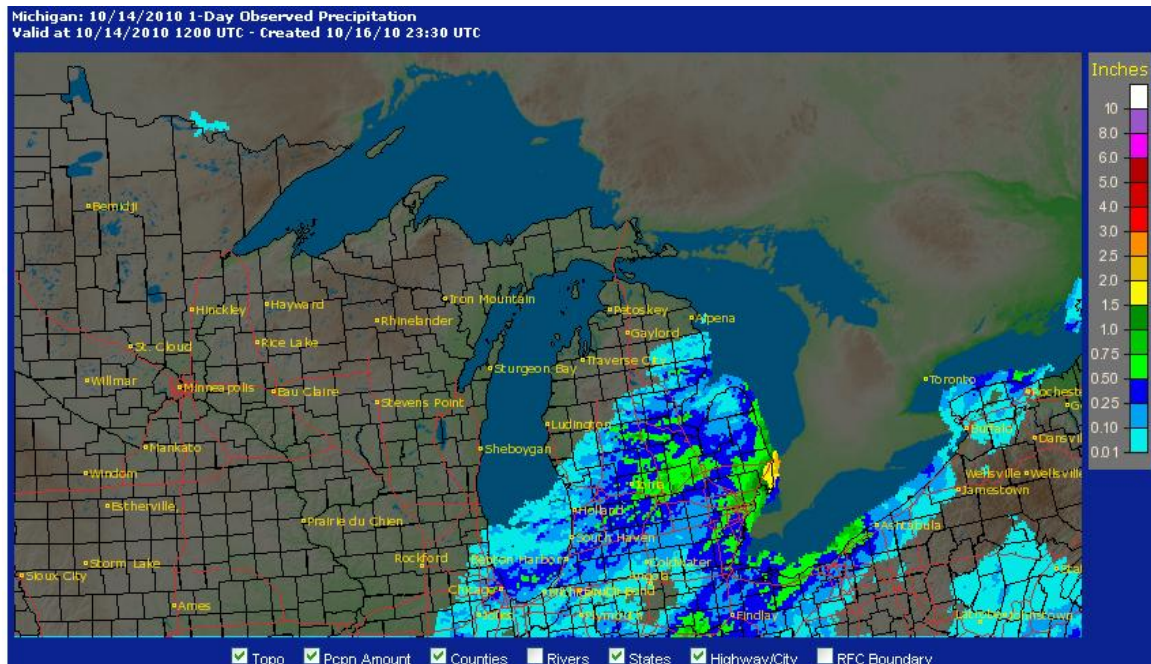


Figure 14. The rainfall event on the 13th into the 14th.

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14th - 15th

A clipper type storm system brought lake enhanced rainfall west of US-131 during the afternoon of the 14th into the early morning hours of the 15th. Rainfall amounts were mostly in the quarter to half inch range near and west of US-131 (Figure 15).

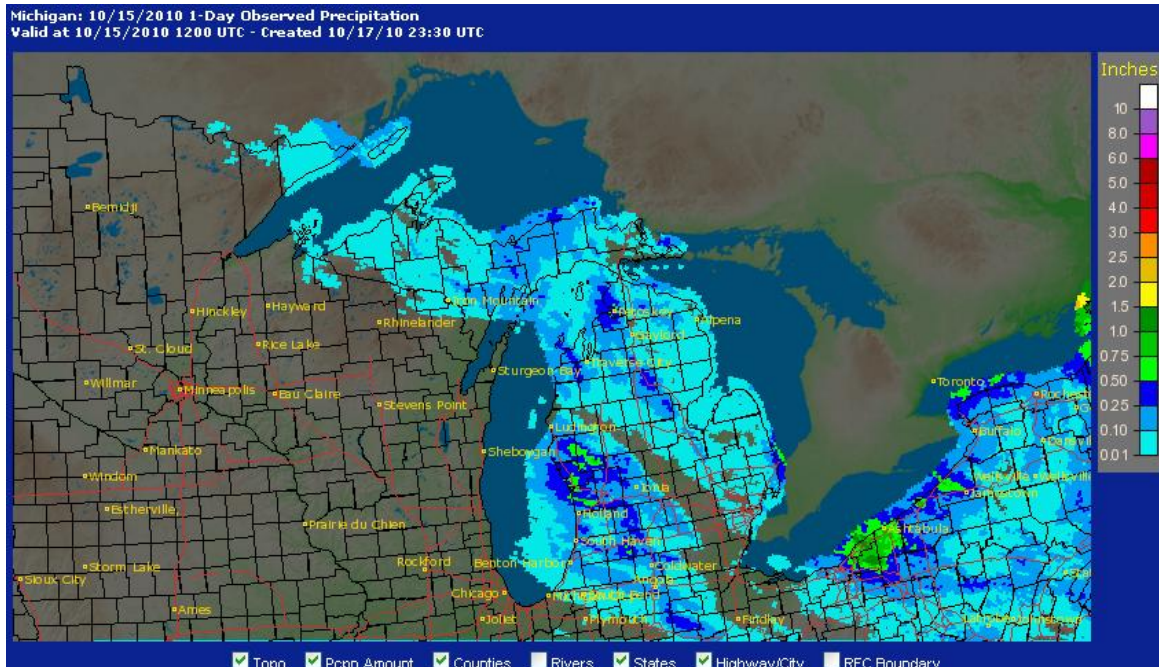


Figure 15. The rainfall event on the 14th into the 15^h.

16th -18th

Quiet weather prevailed and temperatures remained near normal. There was a fair amount of sunshine once again.

19th-20th

Yet another clipper system brought the coldest air of the season into Southwest Michigan. Rainfall from this system was very light. Most areas had either no rain at all or at most less than a tenth of an inch.

21st-22nd

This was the coldest air of the month with highs in the lower to mid 50s and lows in the 20s north and upper 20s to lower 30s south. Skies were nearly clear on the 22nd. Most areas that did not freeze during the cold snap at the beginning of the month froze during the morning of the 22nd. Locations like Muskegon and Grand Rapids had their first freezing low temperatures of the season.

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23st-25rd

Up to 2.5 inches of rain fell near Bloomingdale as a storm system from the Southwestern United States headed for Wisconsin early on the 25th. That pushed a warm front through the area which is what helped trigger the heavy rainfall. This was the heaviest single event of the month (Figure 16).

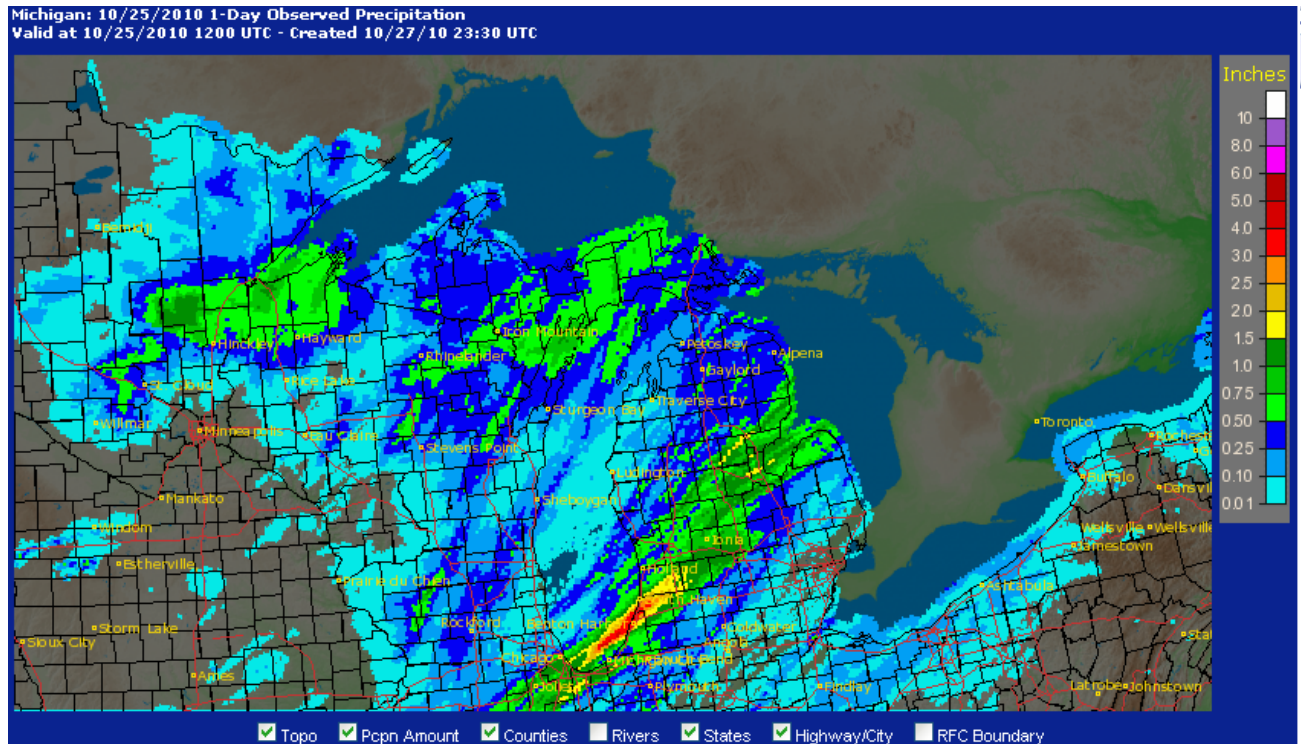


Figure 16. A storm from the Southwestern United States pushed a warm front through the area. That triggered a heavy rainfall event.

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26th -28th

A record breaking low pressure system for the Midwest headed for northern Minnesota on the 26th. That brought an occluded front through the area during the morning hours of the 26th. A large area of rain and strong winds brought some significant wind damage to the area (Figure 17). The Grand Rapids County Warning Area was on the north edge of a large severe storm outbreak on the 26th. There were several tornados reported from near Chicago to Indianapolis during the morning of the 26th. Some areas in our region received between a half inch and one inch of rain (Figure 18).

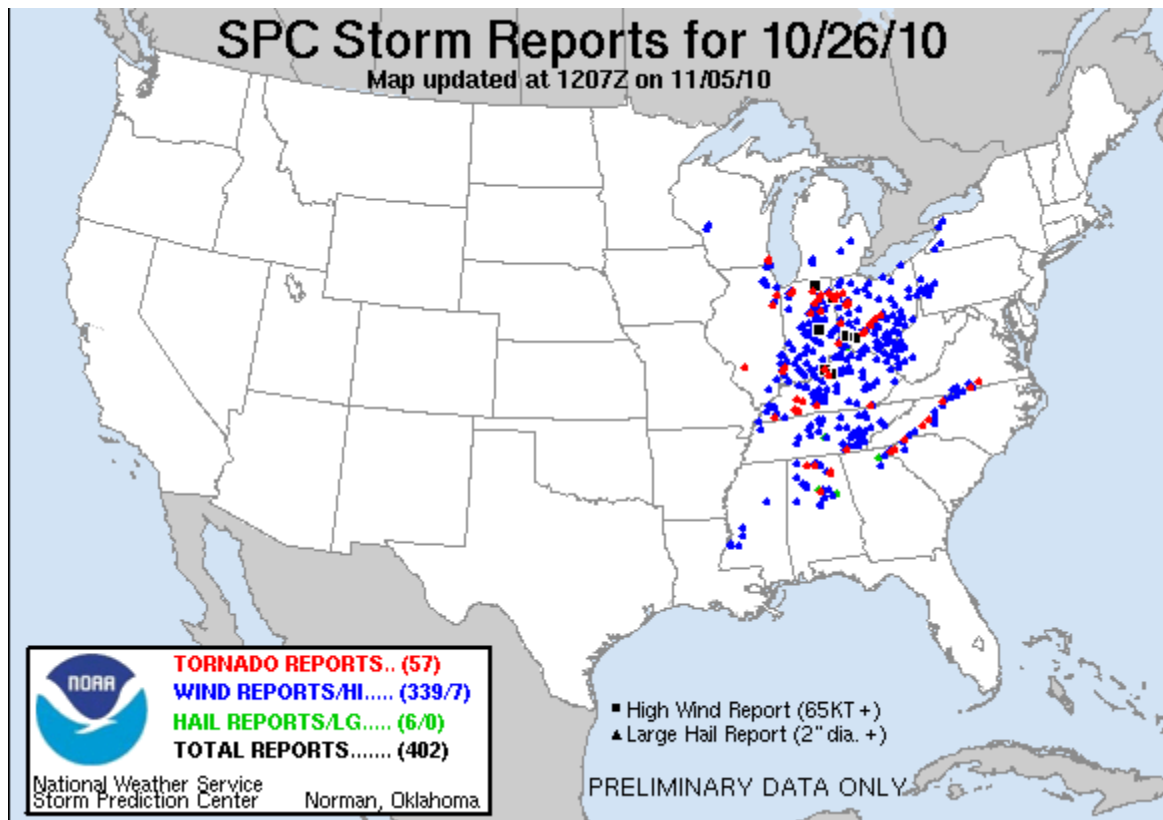


Figure 17. Storm Prediction Center (SPC) severe weather reports on the 26th.

That storm system brought near record low pressure to the area. Grand Rapids had tied the second lowest sea level pressure ever measured in Grand Rapids in October, with a reading of 29.08 inches. High wind warnings remained in effect over Southwest Lower Michigan from the 26th into the 27th. Winds gusted to over 60 mph at some lakeshore locations.

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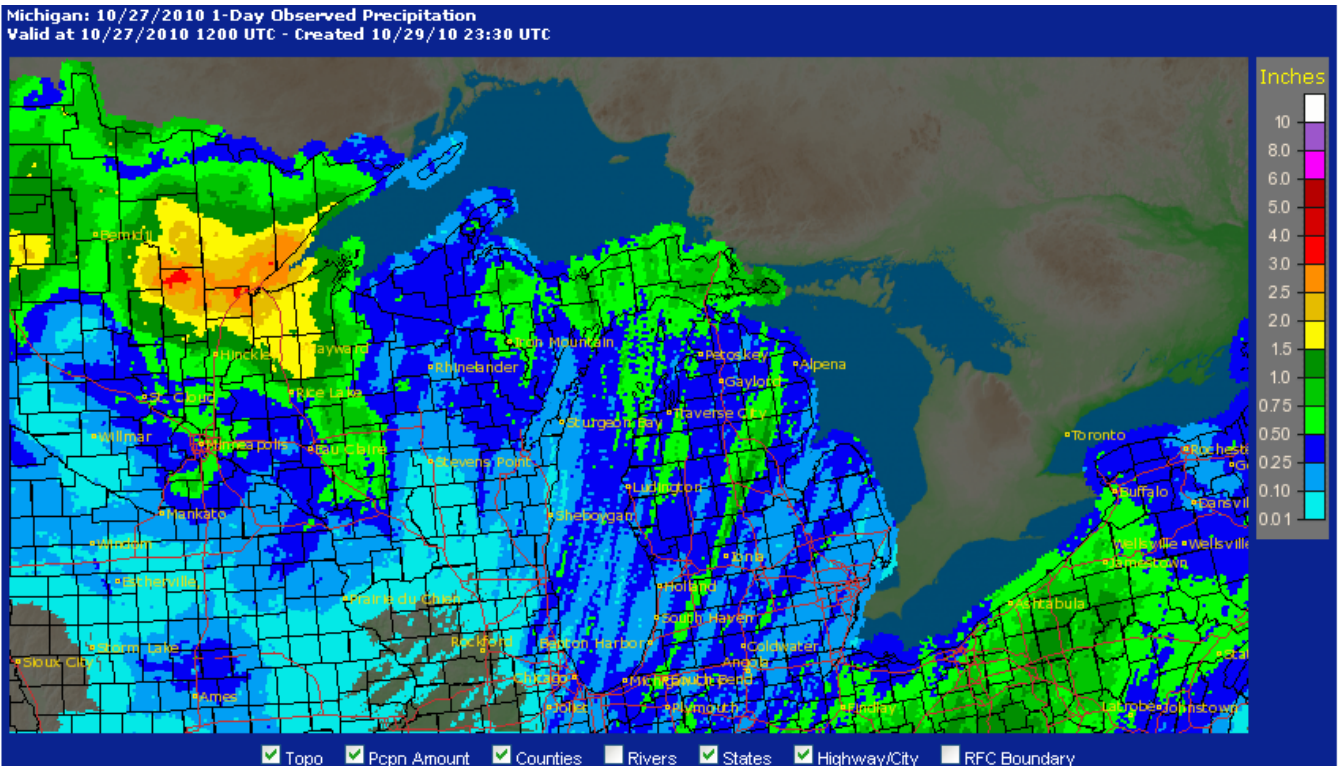


Figure 18 Rainfall from the storm on the 26th.

29th-31st

Quiet, sunny weather returned for the final three days of the month. Temperatures remained near normal.